

App. No. 10/700,290
Office Action Dated July 8, 2005

BEST AVAILABLE COPY

by the current application is provided on page 6. The element groups required by claim 1 are groups as listed in the 1989 IUPAC periodic table. This version of the periodic table is frequently used in Europe. The element groups disclosed by Tanaka are groups as listed in the CAS periodic table. This version of the periodic table is frequently used in the United States. Please see the enclosed paper on page 4 of this Response, titled "Periodic table group". This website printout describes the history and differences between the IUPAC and CAS periodic tables. As is explained in the paper, due to confusion, a new period table now exists replacing both the IUPAC and CAS listings. For example, in the new system, Group 13 corresponds to IUPAC group IIIB and CAS group IIIA.

Therefore, by claim 1 requiring "an element from group IIIB", the claim is requiring an element from group IIIB according to the IUPAC version of the periodic table, also known as Group 13 (of the new version periodic table). See page 9 of this Response for a cross reference chart between the different versions of the periodic tables. Therefore, group IIIB required by claim 1 includes elements from the group including B, Al, Ga, In, and Tl (see column or group 13 on the "IUPAC Periodic Table of the Elements" provided on page 12).

Applicants maintain that there is no overlap between the Tanaka group IIIB and the present group IIIB required by claim 1. Applicants direct the attention of the Examiner again to the cross reference chart on page 9 of this Response, where it is shown that Tanaka group IIIB corresponds to group 3 (consisting of Sc, Y, La series, and Ac series) of the new periodic table system. Therefore a film according to claim 1, containing an element from groups IIa, IIb, and IIIB, would be comprised of different elements than a film taught by Tanaka.

The oxide thin film according to claim 1, containing an element from group IIa, an element from group IIb, and an element from group IIIB, forms a thin film that is able to transmit visible light and thus is ideal for an electronic device (for example a solar cell). In contrast, an oxide thin film according to Tanaka, including mixing elements from the group IIIB, as referenced by Tanaka (Sc, Y, etc.), provides an opaque oxide thin film.

Favorable reconsideration of claim 1 is requested.

App. No. 10/700,290
Office Action Dated July 8, 2005

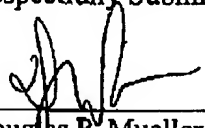
Claims 3-7 were rejected as being unpatentable over Tanaka in view of the Examiner's remarks. Applicants traverse this rejection. Claims 3-7 should be reconsidered allowable for at least the same reasons as claim 1, from which they depend. Applicants are not conceding the correctness of the rejection as applied to the rejected claims. Favorable reconsideration of claims 3-7 is requested.

In view of the above, favorable reconsideration in the form of a notice of allowance is requested. Any questions regarding this communication can be directed to the undersigned attorney, Douglas P. Mueller, Reg. No. 30,300, at (612)455-3804.

Respectfully Submitted,

Dated: October 5, 2005




Douglas P. Mueller
Reg. No.: 30,300
Hamre, Schumann, Mueller & Larson, P.C.
225 South Sixth Street
Suite 2650
Minneapolis, MN 55402
612.455.3800

DPM:mfe

A Periodic Table of the Elements at Los Alamos National Laboratory

1/2 ページ

Page 4

referred to in Reference 1

Los Alamos National Laboratory's Chemistry Division Presents:



A Resource for Elementary, Middle School, and High School Students



Group**

Period	1	2											13	14	15	16	17	18
	1A	2A											3A	4A	5A	6A	7A	8A
1	<u>H</u> 1.008																	<u>He</u> 4.003
2	<u>Li</u> 6.941	<u>Be</u> 9.012											<u>B</u> 10.81	<u>C</u> 12.01	<u>N</u> 14.01	<u>O</u> 16.00	<u>F</u> 19.00	<u>Ne</u> 20.18
3	<u>Na</u> 22.99	<u>Mg</u> 24.31	IIIB 3B	IVB 4B	VB 5B	VIB 6B	VII B 7B	8	9	10	11 IB 1B	12 IIB 2B	<u>Al</u> 26.98	<u>Si</u> 28.09	<u>P</u> 30.97	<u>S</u> 32.07	<u>Cl</u> 35.45	<u>Ar</u> 39.95
4	<u>K</u> 39.10	<u>Ca</u> 40.08	<u>Sc</u> 44.96	<u>Ti</u> 47.88	<u>V</u> 50.94	<u>Cr</u> 52.00	<u>Mn</u> 54.94	<u>Fe</u> 55.85	<u>Co</u> 58.93	<u>Ni</u> 58.69	<u>Cu</u> 63.55	<u>Zn</u> 65.39	<u>Ga</u> 69.72	<u>Ge</u> 72.59	<u>As</u> 74.92	<u>Se</u> 78.96	<u>Br</u> 79.90	<u>Kr</u> 83.80
5	<u>Rb</u> 85.47	<u>Sr</u> 87.62	<u>Y</u> 88.91	<u>Zr</u> 91.22	<u>Nb</u> 92.91	<u>Mo</u> 95.94	<u>Tc</u> (98)	<u>Ru</u> 101.1	<u>Rh</u> 102.9	<u>Pd</u> 106.4	<u>Ag</u> 107.9	<u>Cd</u> 112.4	<u>In</u> 114.8	<u>Sn</u> 118.7	<u>Sb</u> 121.8	<u>Te</u> 127.6	<u>I</u> 126.9	<u>Xe</u> 131.3
6	<u>Cs</u> 132.9	<u>Ba</u> 137.3	<u>La</u> *(138.9)	<u>Hf</u> 178.5	<u>Ta</u> 180.9	<u>W</u> 183.9	<u>Re</u> 186.2	<u>Os</u> 190.2	<u>Ir</u> 190.2	<u>Pt</u> 195.1	<u>Au</u> 197.0	<u>Hg</u> 200.5	<u>Tl</u> 204.4	<u>Pb</u> 207.2	<u>Bi</u> 209.0	<u>Po</u> (210)	<u>At</u> (210)	<u>Rn</u> (222)
7	<u>Fr</u> (223)	<u>Ra</u> (226)	<u>Ac</u> (227)	<u>Rf</u> (257)	<u>Db</u> (260)	<u>Sg</u> (263)	<u>Bh</u> (262)	<u>Hs</u> (265)	<u>Mt</u> (266)	<u>Ds</u> (271)	<u>Uuu</u> (272)	<u>Uub</u> (277)	<u>Uuq</u> (296)	<u>Uuh</u> (298)				<u>Uuc</u> (?)

Lanthanide
Series*

58 Ce 59 Pr 60 Nd 61 Pm 62 Sm 63 Eu 64 Gd 65 Tb 66 Dy 67 Ho 68 Er 69 Tm 70 Yb 71 Lu

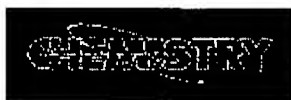
A Periodic Table of the Elements at Los Alamos National Laboratory

2/2 ページ

Page 5

	140.1	140.9	144.2	(147)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0
Actinide Series~	⁹⁰ <u>Th</u>	⁹¹ <u>Pa</u>	⁹² <u>U</u>	⁹³ <u>Np</u>	⁹⁴ <u>Pu</u>	⁹⁵ <u>Am</u>	⁹⁶ <u>Cm</u>	⁹⁷ <u>Bk</u>	⁹⁸ <u>Cf</u>	⁹⁹ <u>Es</u>	¹⁰⁰ <u>Fm</u>	¹⁰¹ <u>Md</u>	¹⁰² <u>No</u>	¹⁰³ <u>Lr</u>
	232.0	(231)	(238)	(237)	(242)	(243)	(247)	(247)	(249)	(254)	(253)	(256)	(254)	(257)

** Groups are noted by 3 notation conventions.

[Downloads](#)[Get Adobe Acrobat Reader for free](#)

Last Updated: 12/11/2003

[about this resource](#)

[LANL | Chemistry Division | DOE | Disclaimer]

The periodic table of the elements

1/1 ページ

Page 6

referred to in the present application

元素の周期表

元素の周期表

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1 H He

2 Li Be B C N O F Ne

3 Na Mg Al Si P S Cl Ar

4 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr

5 Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe

6 Cs Ba Lf Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn

7 Fr Ra Af

8 L La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu

9 A Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr

青 碱土金属
 緑 遷移金属
 赤 非金属
 紫 ハロゲン
 黄 貴ガス

詳細が見たい場合は、各元素上でクリックしてください。

Periodic table group

From Wikipedia, the free encyclopedia.

A **periodic table group** is a vertical column in the periodic table of the chemical elements. There are 18 groups in the standard periodic table.

It is no accident that several of these correspond directly to chemical series: the periodic table was originally created to organize the known chemical series into a single coherent scheme.

The modern explanation of the pattern of the periodic table is that the elements in a group have similar configurations of the outermost electron shells of their atoms: as most chemical properties are dominated by outer electron interactions, this tends to give elements in the same group similar physical and chemical properties.

Group numbers

There are three ways of numbering the groups of the periodic table, one using Arabic numerals and the other two using Roman numerals. The Roman numeral names are the original traditional names of the groups; the Arabic numeral names are those recommended by the International Union of Pure and Applied Chemistry (IUPAC) to replace the old names in an attempt to reduce the confusion generated by the two older, but mutually confusing, schemes.

There is considerable confusion surrounding the two old systems in use (old IUPAC and CAS) that combined the use of Roman numerals with letters. In the old IUPAC system the letters A and B were designated to the left (A) and right (B) part of the table, while in the CAS system the letters A and B were designated to main group elements (A) and transition elements (B). The former system was frequently used in Europe while the latter was most common in America. The new IUPAC scheme was developed to replace both systems as they confusingly used the same names to mean different things.

The periodic table groups are as follows (in the brackets are shown the old systems: European and American):

- Group 1 (IA,IA): the alkali metals
- Group 2 (IIA,IIA): the alkaline earth metals
- Group 3 (IIIA,IIIB)
- Group 4 (IVA,IVAB)
- Group 5 (VA,VB)
- Group 6 (VIA,VIB)
- Group 7 (VIIA,VIIB)
- Group 8 (VIII)
- Group 9 (VIII)
- Group 10 (VIII)
- Group 11 (IB,IB): the coinage metals (not a IUPAC-recommended name)
- Group 12 (IIB,IIB)
- Group 13 (IIIB,IIIA): the boron group
- Group 14 (IVB,IVA): the carbon group
- Group 15 (VB,VA): the pnictogens (not a IUPAC-recommended name) or nitrogen group
- Group 16 (VIB,VIA): the chalcogens
- Group 17 (VIIB,VIIA): the halogens
- Group 18 (Group 0): the noble gases

European (IUPAC)

American (CAS)

Note: *Wikipedia style should be to replace the old names of the groups with the new IUPAC names throughout, with a historical mention of the old name where appropriate.*

Periodic tables

Standard table | Vertical table | Table with names | Names and atomic masses (large) |
Names and atomic masses (small) | Names and atomic masses (text only) | Inline F-block |
Elements to 218 | Electron configurations | Metals and non metals | Table by blocks

Lists of Elements

Name | Atomic symbol | Atomic number | Boiling point | Melting point | Density | Atomic
mass

Groups: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 -
18

Periods: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9

Series: Alkalis - Alkaline earths - Lanthanides - Actinides - Transition
metals - Poor metals - Metalloids - Nonmetals - Halogens - Noble gases

Blocks: s-block - p-block - d-block - f-block - g-block

Retrieved from "http://en.wikipedia.org/wiki/Periodic_table_group"

Categories: Periodic table | Chemical element groups

- This page was last modified 23:49, 28 September 2005.
- All text is available under the terms of the GNU Free Documentation License (see **Copyrights** for details).



Environmental, Chemistry & Hazardous Materials News, Information & Resources

Periodic Table of Elements

This periodic table of elements provides comprehensive data on the chemical elements including scores of properties, element names in many languages and most known nuclides (Isotopes). Below the table there is a "Chemical Elements Sorted By" section with links that will sort chemical elements by various properties.

Newest Features

- **Mercury Pollution April 2005**

- [Increased Mercury Levels Attributed to Industrial Activities](#)
- [Clean Air Act is Contributing to the Mercury Problem](#)

- **2004 ERG (Emergency Response Guidebook) Dec 2004**

Have you ever wondered what those four digit numbers on the placards on the side of trucks and rail cars mean? Our online 2004ERG will give you your answer. This is an online version of the guidebook produced by the USDOT for first responders during the initial phase of a Dangerous goods/HazMat incident.

Please bookmark us and tell your friends.

Please bookmark or [link](#) to this periodic table of elements as you will want to be back! If this site was useful to you, please tell your friends, teachers and/or coworkers about our website.

the present application

Periodic Table of Elements																	
Periods	Groups																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIII			IB	IIIB	IIIB	IVB	VB	VIB	VII
	1A	2A	3A	4A	5A	6A	7A	8A			1B	2B	3B	4B	5B	6B	7B
1	1 H																2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I
6	55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At
7	87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub		114 Uuq		116 Uuh	
6				58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
7				90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Reference

Color Code Key

Physical States etc.

States are at normal temperature and pressure.

Xx Gases

Xx Liquids

Xx Solids

Xx Synthetically prepared elements

Groups

New IUPAC system

Old IUPAC system (primarily in Europe)

CAS system (primarily in North America)

Series

Metals

Nonmetals

Periodic Table of Elements by EnvironmentalChemistry.com

Page 10

Alkali Metals	Alkali Earth Metals	Inner Transition Lanthanides Actinides	Transition Metals	Metals	Metalloids	Nonmetals	Halogens	Noble Gases
Transactinides								

Chemical Elements Sorted By:

- [Atomic Radius](#)
- [Boiling Point](#)
- [Covallent Radius](#)
- [Cross Section](#)
- [Crystal Structure](#)
- [Density](#)
- [Electrical Conductivity](#)
- [Electronegativity \(Pauling\)](#)
- [Heat of Vaporization](#)
- [Ionic Radius](#)
- [Ionization Potential](#)
- [Mass Average](#)
- [Melting Point \(Freezing Point\)](#)
- [Name \(English\)](#)
- [Series](#)
- [Symbol](#)
- [Thermal Conductivity](#)
- [Year of Discovery](#)

Chemistry Articles

- [Atom Anatomy](#)
Answers many questions regarding atoms, including: atomic number, atomic mass (atomic weight), nuclides (isotopes), atomic charge (Ions), and energy levels (electron shells).
- [Chemical Database](#)
An indexed directory of common chemicals used in industry and household products. Contains around 16,000 chemicals with approximately 48,000 synonyms
- [Chemistry & Environmental Dictionary](#)
Defines most of the technical terms and acronyms used on this site as well as many others.
- [The Chemistry of Polychlorinated Biphenyls](#)
PCB, the Manmade Chemicals That Won't Go Away
- [Molar Mass Calculations and Javascript Calculator](#)
Explains how to calculate molar mass and has a Javascript molar mass calculator, which can be used to verify molar mass calculations.
- [Molarity, Molality and Normality](#)
Introduces stoichiometry and explains the differences between molarity, molality and normality.

Related readings and resources

NOTE: Book title links open a popup window to Amazon.com

- [Periodic Table of Elements Bibliography](#)
Reference resources used to compile and verify data used to generate these pages.
- [The Periodic Kingdom: A Journey into the Land of the Chemical Elements](#)
by P. W. Atkins, HarperCollins May 1997
- [Mendeleev's Dream: The Quest For the Elements](#)
by Paul Strathern, St Martins Pr (Trade) April 2001

Periodic Table of Elements by EnvironmentalChemistry.com

Page 11

- **March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure**
by Michael Smith, Jerry March, John Wiley & Sons January 2001
- **The Periodic Table,**
by Primo Levi, et al., Random House. 1996
- **Power of the Periodic Table**
by Roy Timmreck, Royal Palm Pub. 1991

Providing a Link

If you would like to link to this periodic table of elements, please use the following link code.
 EnvironmentalChemistry.com: Periodic Table of Elements

If you would like to include a description along with the link, please consider using the following:

This periodic table of elements provides comprehensive data on the chemical elements including scores of properties, element names in many languages and most known nuclides.

We greatly appreciate every link provided to our periodic table of elements.

Disclaimer

WARNING: These pages are for general reference and educational purposes only and MUST NOT be used to determine regulatory compliance or relied upon where matters of life and health are concerned. This site and the author do not warrant or guarantee the accuracy or the sufficiency of the information provided and do not assume any responsibility for its use.

To ensure regulatory compliance when transporting hazardous materials or dangerous goods, one must receive proper training and certification from a qualified instructor and refer to a copy of the current year's Code of Federal Regulations Title 49 (49CFR) or your country's shipping regulations. When shipping hazardous cargo by air, one should refer to IATA regulations. In matters regarding workplace safety, one should refer to current OSHA regulations (29CFR) and NIOSH guidelines or your own country's health and safety regulations. No one should ever enter into a hazardous environment without proper training from qualified instructors.

Copyright 1995 - 2005 Kenneth L. Barbalace (KLBProductions.com)

referential

IUPAC Periodic Table of the Elements

1		2		3										13		14		15		16		17		2
hydrogen 1.007 84(7)	H																					helium 4.002 602(2)		
	3																							
	Li																							
	Be																							
	11																							
	Na																							
	Mg																							
	12																							
	19																							
	K																							
	20																							
	Ca																							
	21																							
	Sc																							
	22																							
	Ti																							
	23																							
	V																							
	24																							
	Cr																							
	25																							
	Mn																							
	26																							
	Fe																							
	27																							
	Co																							
	28																							
	Ni																							
	29																							
	Cu																							
	30																							
	Zn																							
	31																							
	Ga																							
	32																							
	Ge																							
	33																							
	As																							
	34																							
	Se																							
	35																							
	Br																							
	36																							
	Kr																							
	54																							
	Xe																							
	86																							
	Rn																							
	118																							
	119																							
	120																							
	121																							
	122																							
	123																							
	124																							
	125																							
	126																							
	127																							
	128																							
	129																							
	130																							
	131																							
	132																							
	133																							
	134																							
	135																							
	136																							
	137																							
	138																							
	139																							
	140																							
	141																							
	142																							
	143																							
	144																							
	145																							
	146																							
	147																							
	148																							
	149																							
	150																							
	151																							
	152																							
	153																							
	154																							
	155																							
	156																							
	157																							
	158																							
	159																							
	160																							
	161																							
	162																							
	163																							
	164																							
	165																							
	166																							
	167																							
	168																							
	169																							
	170																							
	171																							
	172																							
	173																							
	174																							
	175																							
	176																							
	177																							
	178																							
	179																							
	180																							
	181																							
	182																							
	183																							
	184																							
	185																							
	186																							
	187																							
	188																							
	189																							
	190																							
	191																							
	192																							
	193							</																



Notes

* "Aluminum" and "Carbon" are commonly used alternative spellings for "Aluminium" and "Carbide".

* IUPAC 2001 standard atomic weights (which relate to atomic masses) are listed with uncertainties in the last figure in parentheses (e.g., D, 1.007 84(7), 1.007 825 0(10)).

These values correspond to current best knowledge of the elements in neutral terrestrial samples. For elements that have no stable or long-lived isotopes, the mass number of the nucleus with the longest confirmed half-life is listed between square brackets.

* Elements with atomic numbers 112, 113, 114, 115, and 118 have been reported but not fully authenticated.

Copyright © 2005 IUPAC, the International Union of Pure and Applied Chemistry. For updates to this table, see http://www.iupac.org/periodic_table. This version is dated 4 February 2005.

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ BLACK BORDERS

☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES

☐ FADED TEXT OR DRAWING

☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING

☐ SKEWED/SLANTED IMAGES

☒ COLOR OR BLACK AND WHITE PHOTOGRAPHS

☐ GRAY SCALE DOCUMENTS

☐ LINES OR MARKS ON ORIGINAL DOCUMENT

☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY

☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.